

FOREST MANAGEMENT TRAIL

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Ontario

Ministry of
Natural
Resources

Forest Management Trail

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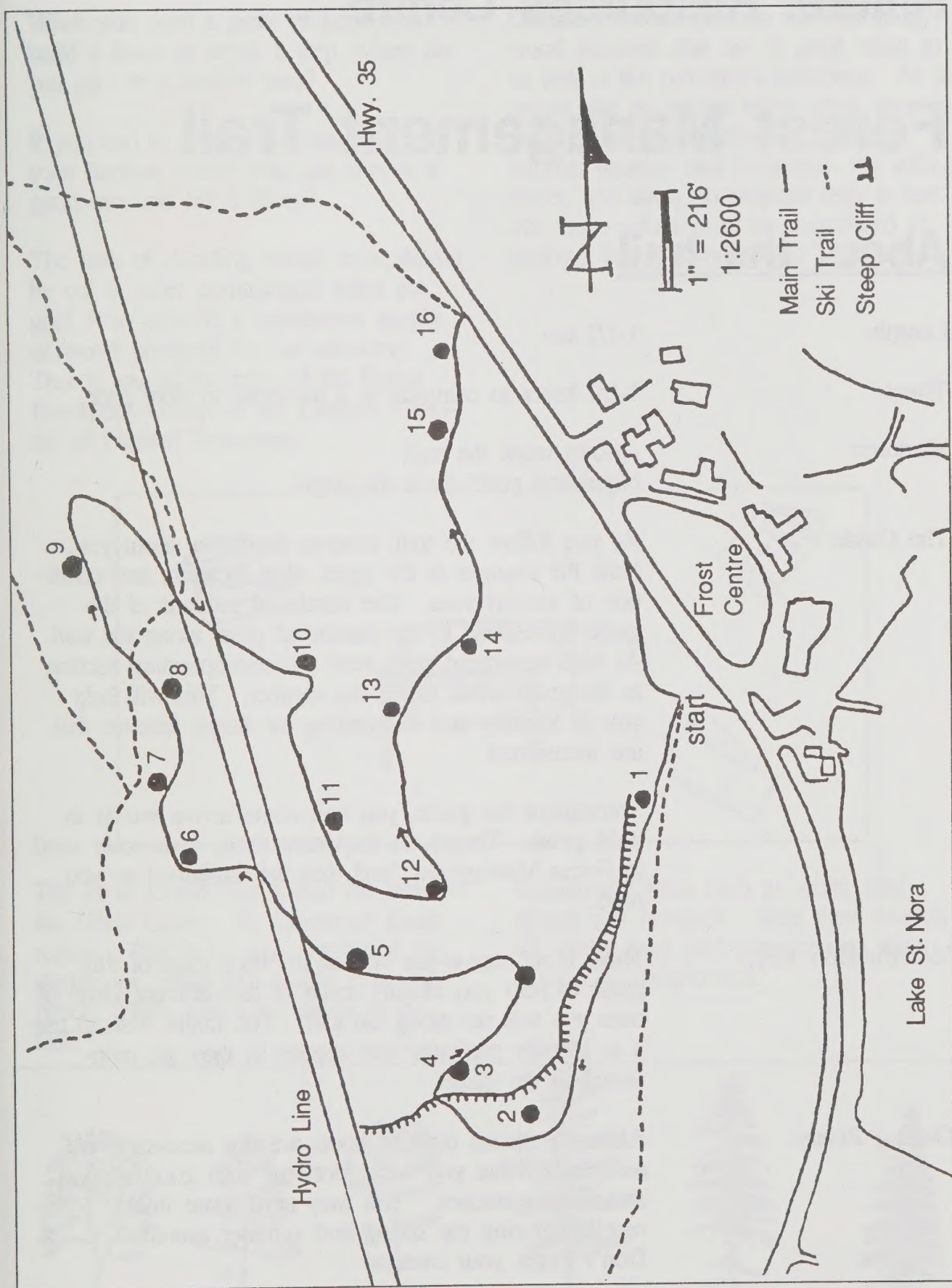
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Leslie M. Frost

Natural Resources Centre

Forest Management Trail

About the trail

- Length: 1-1/2 km
- Time: 1-1/2 hours to complete at a moderate to slow pace.
- Markers: Arrows mark the trail.
Numbered posts mark the stops.
- The Guide: As you follow the trail, observe the forest about you. Note the changes in the types, size, location, and condition of various trees. The numbered sections of the guide correspond to the numbered posts along the trail. At each numbered post, read the corresponding section in the guide while facing the number. This will help you in locating and interpreting the forest features that are mentioned.
- Throughout the guide, you will come across words in **bold print**. These are important terms commonly used in Forest Management, and they are explained as you read.
- Identification Key: There is an easy-to-use key on the back page of this guide to help you identify some of the different kinds of trees you will see along the trail. You might wish to use it to identify particular tree species as they are mentioned in the guide.
- Getting Ready: Although special outdoor boots are not necessary, we recommend that you wear footwear with good support and water resistance. You may need some insect repellent during the spring and summer months. Don't forget your camera!

All Set? Let's Go!

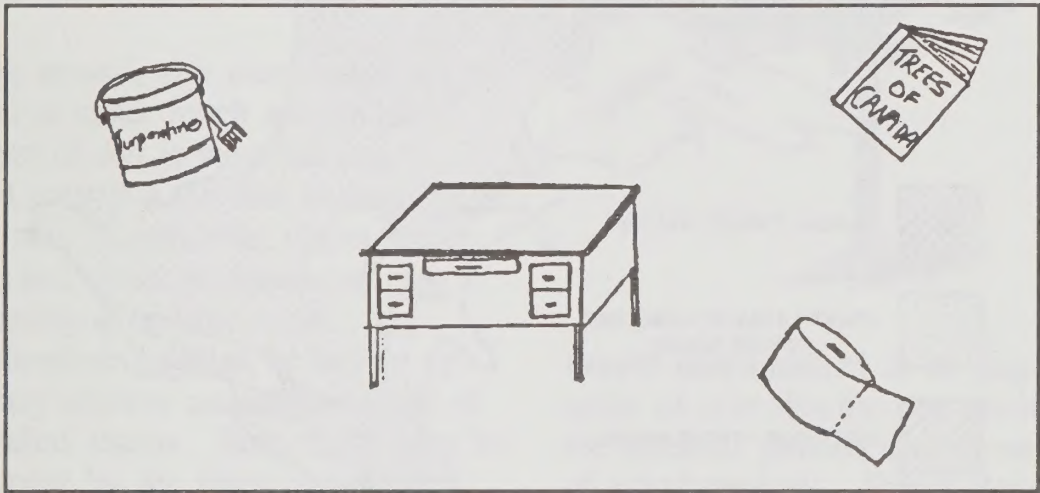
Introduction

When you need a piece of lumber to build a fence or repair a step, where do you go - to a lumber yard?

If you had to go into the woods to get your lumber, would you just choose a good tree and cut it down?

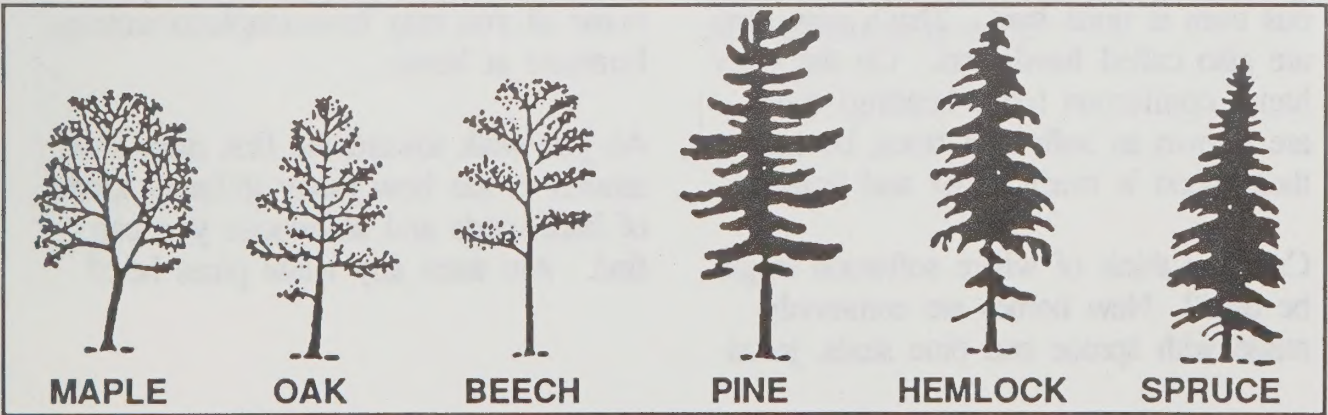
The task of deciding which trees should be cut is more complicated when the goal is to provide a continuous supply of wood products for our economy. This is one of the roles of the Forest Resources Group of the Ontario Ministry of Natural Resources.

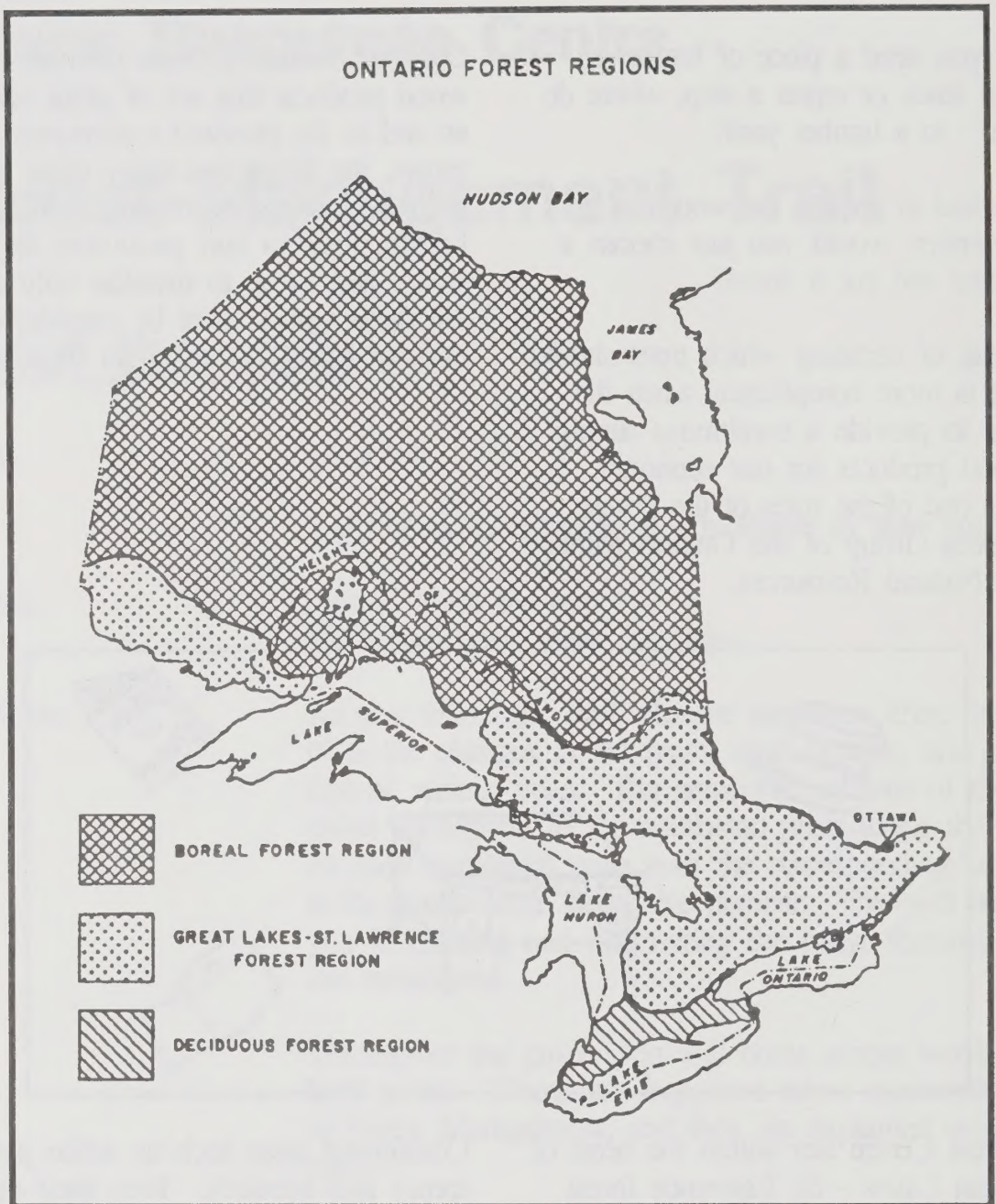
Ontario's forests provide us with many wood products that are of great value to us and to the province's economy. As it grows, the forest has many other uses such as scenery, recreation, wildlife habitat, tourism and protection for soils, rivers, and lakes, to mention only a few. All these values must be considered in making forest management decisions.



The Frost Centre lies within the heart of the Great Lakes - St. Lawrence forest region. This is an area dominated by **deciduous** trees like maple, oak and beech, which lose their leaves in the fall.

Coniferous trees such as white pine, spruce and hemlock, keep their needles all winter long, and grow among their deciduous neighbours.





As a rule of thumb, the wood of deciduous trees is quite hard. That's why they are also called **hardwood**. On the other hand, coniferous (cone-bearing) trees are known as **softwood** trees, because their wood is much softer and lighter.

Can you think of where softwood might be used? New homes are commonly made with spruce and pine studs, joists

and rafters. How about hardwoods? Some of you may have maple or oak furniture at home.

As you walk toward the first stop, look around to see how many different kinds of hardwoods and softwoods you can find. Are there any white pines here?

Post 1 - The Great Lakes - St. Lawrence forest

While walking along the trail, did you notice the towering coniferous trees? These are white pines, Ontario's majestic emblem tree.

In 1806, when Napoleon blockaded the Baltic Sea, he cut off Britain's supply of forest products from central Europe. Turning to Canada, Britain found a new source of timber for ships' masts in the forests of white pine. By the 1860's, logging had arrived in what is now Haliburton and Muskoka.

Looking around, you may notice that the land is rather rough and broken. The layer of soil is very thin and exposed rock like the cliff ahead of you, is common. Landforms, slopes, depth of soil, and moisture conditions vary considerably over large areas. The forest therefore tends to be broken up into many clusters and communities of trees, called **stands**. Each stand must be investigated by the forest manager. They then decide the best way to grow, protect, harvest and renew the trees. Forest managers are called **foresters**. Along the trail, we would like you to see the forest as if you were the forester. By closely observing your forest you will be able to make wise forest management decisions.



Forest management is an ongoing series of activities that are carried out in the forest to provide a continuing supply of wood products. Forest management activities include constructing roads into the forest, harvesting trees, renewing the forest with seedlings of valuable species and protecting the new growth. These activities can be combined into a series of events that best suits the needs of particular stands of trees, and is called a **management system**.

Post 2 - Species and sites

Different types of trees, or **species**, require different soil and light conditions for growth - these are known as **site conditions**. It is important that we consider site conditions when managing for the right tree species and the best growth. At this stop we see a range of site conditions, and a variety of tree species, each with its own site requirements. Between the post and the cliff is a bowl-like depression where water accumulates in the soil. Yellow birch trees prefer the moist soil conditions found here.

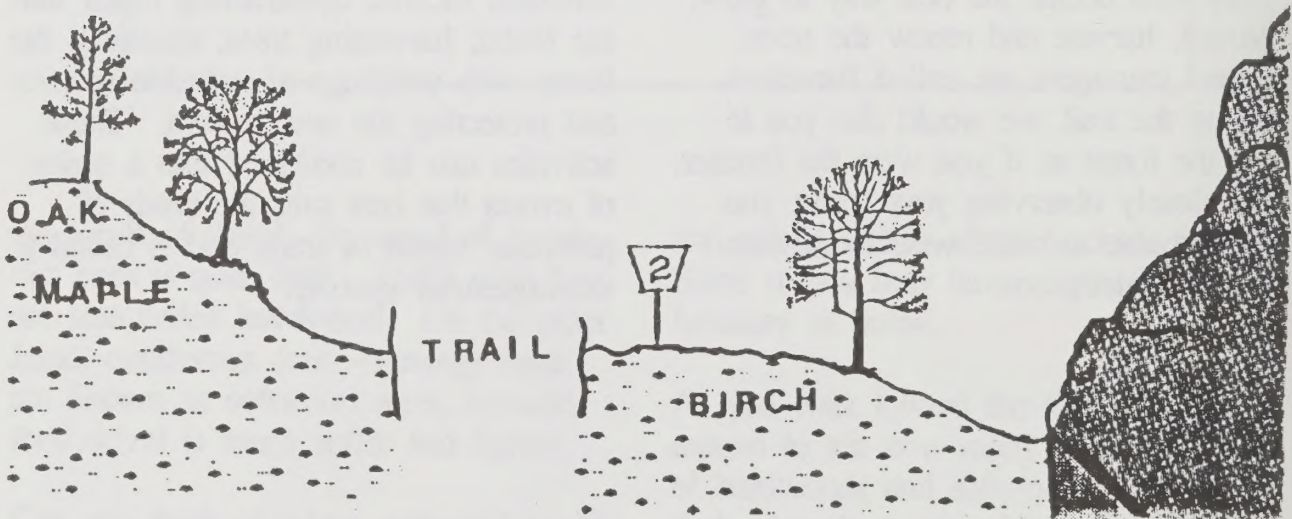
Behind you, on the ridge sloping towards you are red oak and sugar maple trees. The shallow, rocky, dry soil favours red oak. Fresh, well drained soils on middle slopes support the best maple growth.

Tree height can indicate the quality of the site. The taller the tree, the better the growing conditions at the site.

In choosing a management system the forester must first decide on the best tree species for the site. The trees must be cut in such a way as to provide the proper space and light conditions for new trees to grow from seed. By matching the preferred species to the right site you will be able to grow the greatest amount of the best quality timber in the shortest possible time.

A forester growing trees can be compared to a farmer growing crops. The farmer's business is called agriculture. The forester's business, dealing with trees, is called **silviculture**.

At the next stop, you will see an example of a forest management system.



Post 3 - The Shelterwood System

This ridgetop with its shallow soils supports a good number of red oak trees of the same age and size. Together, these make up a forest stand. This stand developed following a major disturbance such as clearcutting or fire. To regenerate or grow new trees, red oak seedlings require bare soil and openings for partial sunlight. At the same time, the seedlings need protection from the full summer sun, late spring frosts, and competition from weeds and shrubs that invade forest openings. This protection is created by removing about one half of the trees from the stand. While the remaining trees provide shelter and a source of seed, underneath a new crop of red oak seedlings becomes established.

To your left is an example of such a **shelterwood** cut. The forester may decide to use one of two variations of the Shelterwood system. Here, the trees have been removed uniformly from the stand. This is an example of a Uniform Shelterwood system. When trees are removed in groups, the system is called Group Shelterwood. The seed trees will remain standing to seed in the new openings and protect the growing seedling that will take root. Within 20 years, once the new crop, or regeneration, is well-established, the seed trees can be cut. A new even-aged stand of red oak will then be free to grow.

Trees to be cut or left as shelter trees are first marked with paint. In the uncut stand to your right, you can see various paint markings:

Blue dots - seed trees, selected for their healthy tops or crowns, and their ability to produce seed.

Yellow dots - sound trees, but crowding seed trees; these should go to the sawmill for lumber.

Yellow x's - trees of poor health that should make way for seed trees; these will make firewood.

(Blue lines or numbers - simply mean that the trees have been measured).

This uncut area to your right is what the stand on the left looked like before the Uniform Shelterwood cut took place.

The forester relies on nature's cooperation in providing an oak seed crop. This does not always happen. This site can be quickly invaded by aggressive but unwanted plants and trees. These choke out any red oak that may spring up in future seed year.

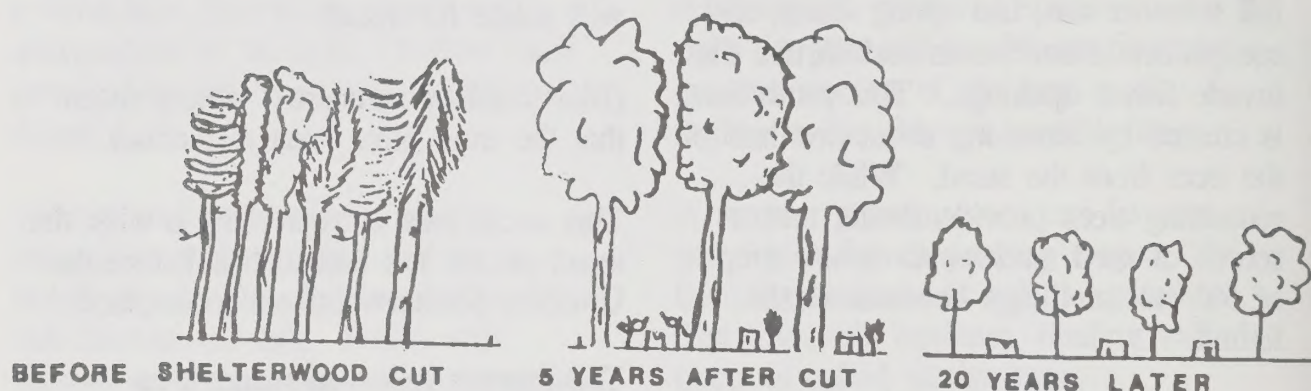
This has happened here. What would you do?

The competing vegetation must be held back to allow red oak to become established. How can you do this?

Herbicide, fire or mechanical uprooting are three silvicultural "tools" that can be used. All are used safely and effectively by trained people working in the MNR.

But you may not have a seed crop next year. To be sure of a future forest, red oak seedlings can be planted.

Further along the trail, at **Post 13**, you can see red oak saplings that were regenerated from seed about 30 years ago after a Shelterwood cut.



If a stand of red oak is near a deer yarding area, foresters will alter the Shelterwood System to not only provide new seedlings, but also to provide acorns as food for deer. In this case the shelter trees would not be cut until the new seedlings grow big enough to start producing acorns themselves. This is an example of **Integrated Resource Management**. The forest is managed to make use of an area of land for more than one use.

The Shelterwood System is only one of three silvicultural systems used by the MNR to manage Ontario's forests. At **Post 7** you will see the Selection System, and at **Post 10** and **11**, examples of the Clearcut System.

Post 4 - Hardwood regeneration

The forest is a living, growing community of trees. Trees are born, they grow, and eventually die. After disturbances such as windstorms, wild fire, insect attacks or logging, the forest renews itself but left to nature, what will tomorrow's forest look like?

You are standing in front of the original location of an old fire tower. This area once had a well-maintained lawn. Notice all the maple saplings now growing on this site. This seems somewhat of a mystery. Look at all the large red oak seed trees in this area.

Why don't we see any red oak seedlings?



Sugar maple seedlings have the ability to survive on sites which might be too harsh for red oak. The tap roots of the maple seedlings are better able to penetrate the thick grass mat to reach the mineral soil beneath.

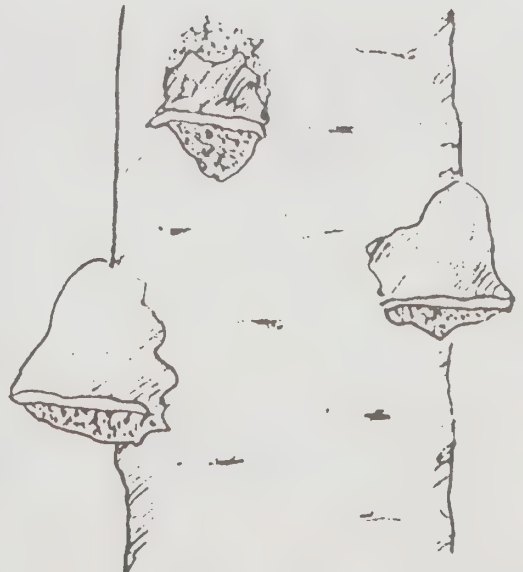
It is possible that nature may have provided a poor seed crop for oak in the face of a bumper crop for maple, at the time the fire tower was removed.

Forest creatures may also have played a role in shaping this forest stand. Red oak seedlings are a favourite food of deer, whereas sugar maple is not.

Each tree species has its limitations. Poor site conditions may not let you grow the most desirable tree species. Sometimes, the species best suited to the site is very hard to start growing.

Let to nature, tomorrow's forests are not always the best the land can grow. Sometimes nature needs a hand.

On your way to the next stop, you will encounter some older trees. Look for signs of old age and poor site. Conks of shelf-like fungi growing on trunks signal that the tree is not healthy.



Post 5 - Tree quality

Timber products such as sawlogs and veneer, are produced from trees of good quality with straight stems and little or no defect. In this beech and sugar maple stand, you may notice that a lot of trees are declining in health. Can you see the conks growing on some of the trees? They indicate that the tree has rot inside, which may have spread out several feet above and below the conk. Branch stubs are another form of defect which creates a bumpy trunk and may be entry points for decay.

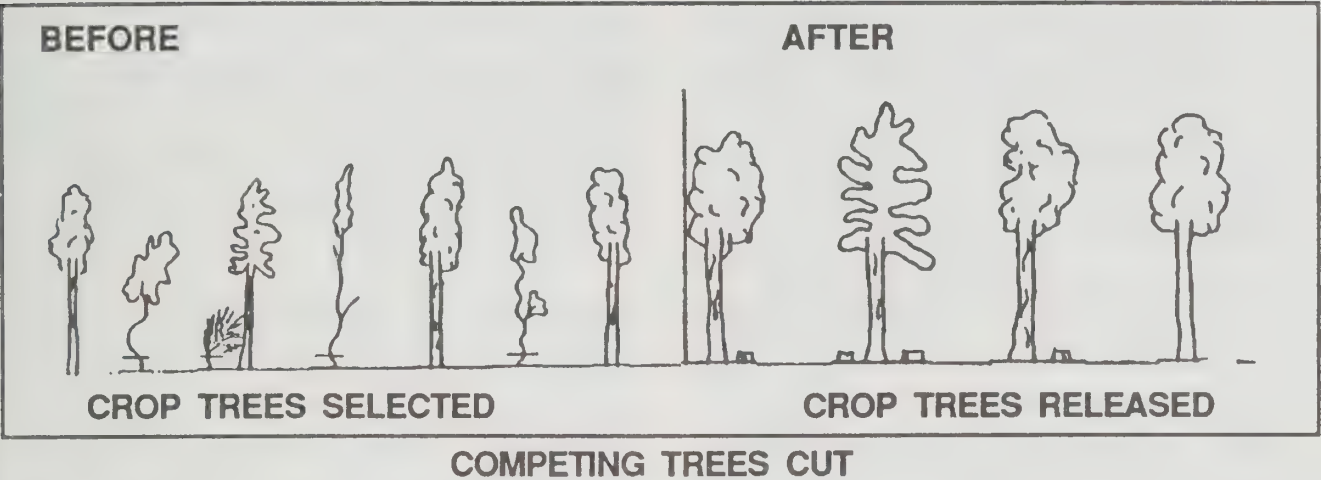
Decay-causing fungi can invade a tree through dead branches and tops. Frost cracks and seams often hide rot beneath and reduce the number of boards that can be sawn from the tree. Most tree diseases prefer to attack trees which are declining in health. Foresters refer to such unhealthy trees as **decliners**. Can you spot any defects on the decliners surrounding you?

The poor condition of the trees in this area is an example of what happens when the forest is not properly managed. In the past, only the best quality trees were removed from the stand, leaving the poorer trees behind. This has resulted in a low quality forest. **Highgrading**, which is the taking of the best trees, is a poor management practice with only short-term benefits and is not condoned by the Ministry of Natural Resources.

Proper forest management can turn a poor quality forest such as this into a healthy, high quality one. Ahead you will see some ways to do this.



Post 6 - Crop Tree Release



Management systems such as Shelterwood and Clearcut will produce a new forest of trees that are all about the same age and size. Young even-aged forests contain a number of trees which have straight stems, are free of defect, and show good height and diameter growth.

Such **crop trees** need more space around them in order to grow into larger, more valuable trees. By removing defective and competing trees around them, these trees are **released**, and allowed to grow faster.

You have just walked through a young stand of even-aged trees in the polewood stage that has been marked for Crop Tree Release. Take a look at the marking pattern in the stand to your

right. Blue dots indicate future crop trees. Yellow dots indicate lower value trees to be removed to provide necessary growing space for the crop trees. These poorer trees can still be used for low grade sawlogs. Trees marked with a yellow "X" are defective **culls**. These often have excessive rot, and will be removed from the stand for fuelwood. Unmarked trees, although not crop trees, are not competing with crop trees and will be left uncut for now.

It is often necessary to maintain a certain level of tree cover to protect the site from too much sun and wind. By providing crop trees with more "elbow room" to grow, the future growth that would have been put on by the poorer trees will now be added to the crop trees.



Post 7 - The Selection System

In this stand grow hardwood species such as sugar maple and beech, which are very tolerant of shade. These **tolerant hardwoods** continually establish seedlings that can grow in the dense shade of older, larger trees and so, a range of tree ages and sizes can be found in such tolerant hardwood stands.

In the **Selection System**, a small percentage, perhaps 30% of the older trees are harvested about every 20 years. In the 20 years between harvests, the remaining trees grow back the amount of wood that has been removed. The 20 year cycle of harvest and ingrowth can be repeated over and over again as time goes on.

When the Selection System is used to remove decliners and cull trees, the forest will be improved. In the next cutting cycle, you can look forward to harvesting the better quality trees that you have left to grow.

However, if the Selection System is abused and only the best trees are removed each time, then only poor trees will be left for future harvests. Do you recall what this poor management practice is called?

At this location, decliners are marked with a yellow dot and culls are marked with a yellow "X". These trees should be removed from the stand. Eventually, a high quality uneven-aged forest, containing valuable wood products such as veneer and lumber for the manufacture of fine furniture, will grow on this site.



UNEVEN AGED, MIXED FOREST



Post 8 - Yellow birch management

Yellow birch trees are well suited to this site. They thrive on a cool north-facing slope where water in the ground moves freely. For best growth, yellow birch needs more light than its more shade tolerant associate, sugar maple. In order to renew yellow birch, the Uniform Shelterwood, rather than the Selection System is used.

In front of you is an example of a stand marked for cutting under the Uniform Shelterwood system. Yellow birch seed trees, marked with blue dots, will be left standing to provide seed and protect the seedlings from exposure to extreme weather conditions. All other trees will be removed.

The cutting operation will take place in the late summer or fall in a year when yellow birch trees produce a lot of seeds. These seeds are very tiny, and when they start to sprout, or germinate, produce only a tiny root in search of mineral soil. The thick layers of leaves that accumulate each year on the ground prevent the roots from penetrating to the

mineral soil beneath. Most, if not all, seeds would die unless the leaf layer is scuffed up, or **scarified**. Mixing the leaf litter with mineral soil provides an ideal seedbed for yellow birch. Where the logging activity itself is not enough to disturb the soil, machinery such as bulldozers dragging heavy chains with spikes will have to be used for scarification.

Yellow birch is a tree valued by the forest industry because of its beautiful wood, but it is also a favourite food of the white-tailed deer. This presents the forest manager with a dilemma - producing trees or deer. When there are too many deer, they can actually prevent the birch from regenerating. Healthy deer populations provide good hunting opportunities, which in turn keeps the number of deer to the point where they don't damage their habitat, and seedlings have a chance to grow. This is another example of how the forest can be managed for several uses at the same time.

Post 9 - Logging damage

The stand ahead of you is being managed under the Selection System. Poor quality trees, overmature decliners, less desirable species and trees competing with growers were marked for cutting.

Ideally, the harvesting of a timber stand is done in such a way as to minimize damage to other trees. Unfortunately, during this cutting operation, several crop trees were damaged or knocked down by other falling trees. Notice the broken tree in the cut area.

As a result, the stand has been opened up too much. The shade tolerant trees that the forester wanted to promote, now face competition from aggressive light-

demanding species. The skill of the logger in felling and skidding trees is a very important factor in successful forests management. Unnecessary damage to remaining trees will reduce the quality and value of the future forest crop.

The Ministry of Natural Resources not only marks trees to be cut, they also monitor logging operations by cut inspections. Logging must be carried out in accordance with the terms and conditions set out in the Crown Timber Act. Anyone who doesn't can expect to pay fines.

Post 10 - Selection or clearcut

The clearcut system removes the entire stand of trees at one time. This is normally done when full sunlight is needed on the ground to stimulate a new forest of sun-loving trees. Sometimes this system can also be used for trees more tolerant of shade, like maple.

Does the stand have any crop trees? Are there trees of different ages and sizes? Is there a carpet of regeneration already on the ground? If not, it will take a long time to mould such a stand into a high quality all-aged forest by using the Selection System.

You can grow a maple forest as an even-aged crop. First, clear off entire cover of poor quality trees, then start over again with new seedlings. As time goes on, weed out the poorest, giving the best seedlings and saplings more room to grow. Be sure to remove aggressive sun-loving kinds of trees and shrubs while you're at it, and soon your new young forest will overtop and shade out the competitors.

Ahead of you is a small clearcut carried out in a poor quality maple stand such as the one behind you. Can you see the sugar maple regeneration in the cutover?



POOR QUALITY STAND

STARTING OVER



CLEARCUT



EVEN AGED, SHADE TOLERANT STAND

Beyond the clearing is an even-aged tolerant hardwood stand resulting from a similar clearcut some 40 years ago. Here, crop trees will be released 10 to 20 years from now.

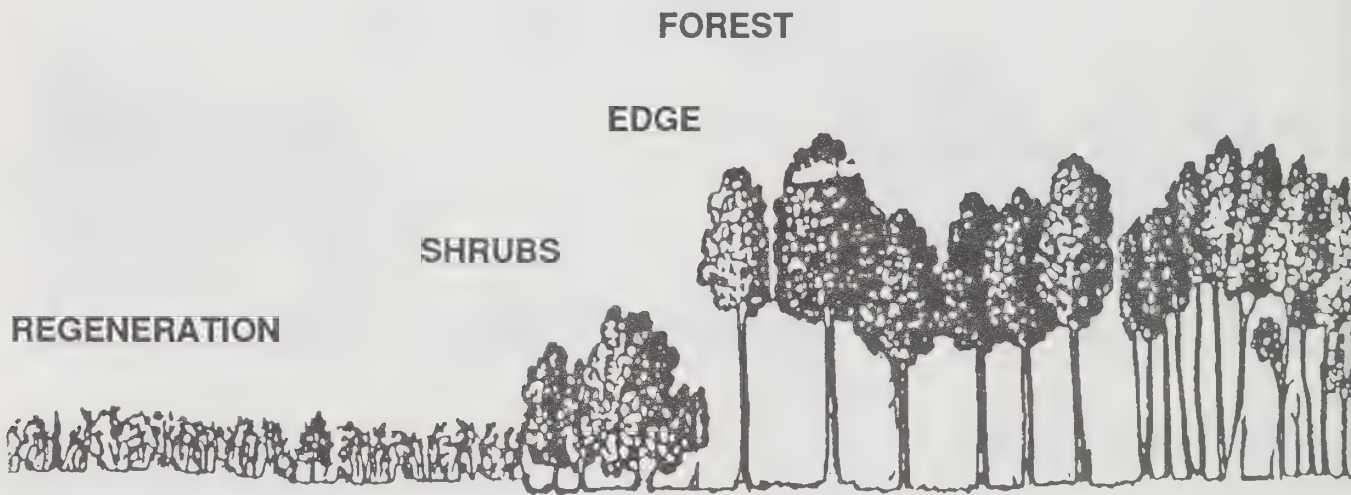
Post 11 - Clearcutting largetooth aspen

Some trees such as aspen need full sunlight in order to grow. We call such trees **intolerant hardwoods** because they cannot tolerate growing in the shade of larger trees. The forest must be opened up completely, or clearcut, to allow sunlight to reach the ground.

After the trees are removed, the increased light and temperature stimulate dormant buds on the remaining root systems. These buds produce **suckers**, or separate stems which spring up from the root system of the parent tree. These suckers grow to produce an even-aged aspen stand.

Although largetooth aspen produce abundant seed which are spread great distances by wind, very few seeds will actually germinate. Most aspen stands are regenerated by suckering following a disturbance such as a forest fire or clearcut. In this small clearcut, made in January, 1986, we may find thousands of vigorously growing aspen suckers.

It is not surprising that wildlife are attracted to clearcuts. The mingling of old forest with patches of young trees creates **forest edges**, which provide a variety of food and shelter. In this way, clearcutting can also be used by forest managers to improve wildlife habitat.



Post 12 - What happened here?

What kinds of trees grow here? What size are they? Are they about the same age?

Observe the marked uncut stand to your left, and the results of a cutting operation in a similar stand to your right. Trees of high quality, are marked blue, while yellow marked trees (both dots and "X's") are trees which will be removed. Again, some trees are left unmarked.

Can you identify the marking system in this stand?

This is an example of a crop tree release operation in an even-aged tolerant hardwood stand about 40 years of age. Such a forest management practice will provide high quality logs for a future harvest.

How did you do?

Post 13 - Shelterwood regeneration - 30 years later

Do you remember, near the start of the trail, climbing the stairs to reach Post 3? There we saw a red oak stand which had recently been cut using the Uniform Shelterwood System.

Here we see a stand that was cut the same way in the late 1950's. Notice the sapling stand that has resulted.

A particularly good seed crop after the harvest, combined with good conditions for seedling survival, have helped to create this new forest.

The red oak saplings marked with orange dots are examples of trees growing directly from acorns.

Post 14 - The logic of Clearcutting

This stand of largetooth aspen and red oak in front of you is the result of a clearcut some 40 years ago. The clearcut area we saw at Post 11 will resemble this stand 40 years from now. Many of these aspen trees were small suckers that sprouted following the cutting operation. The more tolerant red oak grew under the light shade of the emerging aspen.

Species such as largetooth aspen and red oak growing together are well suited to the Clearcut System. Abundant natural regeneration following logging has produced a healthy young stand.

In nature, the less tolerant species such as aspen, white birch and even red oak are reborn following natural catastrophes like forest fires, severe windstorms, or insect epidemics. These disturbances open up large and small tracts of forests. A managed forest must likewise provide openings of various sizes if these types of trees are to reproduce and grow. For this, foresters use the Clearcut System.

Post 15 - Coppice

In the aspen clearcut at Post 11, we saw a form of tree reproduction called "suckering", which can create a new forest stand. At this stop we see another type of reproduction known as stump sprouting or coppice growth. The clumps of red oak trees in front of you were produced from a parent stump. After the parent tree was cut or killed by fire, these sprouts grew from dormant buds which formed when the parent tree was just a seedling.

The coppice method of stand renewal is simple, quick and inexpensive. Sprouts have the advantage of using the established root system of the parent tree, allowing coppice to grow rapidly and outgrow other competing vegetation. Stump sprouts can develop into sound, high quality trees; however, a large number of the sprouts must be thinned to 2 or 3 stems to release these for good growth. And in the future, when these mature stems are harvested, new coppice growth will again sprout from the parent stumps.

Post 16 - A management decision

This even-aged polewood stand, at about 40 years of age, has an interesting variety of hardwood species, including sugar and red maple, white ash, red oak, white and yellow birch, and ironwood. Can you pick out each of these species? For help, please refer to the identification key in the back of this guide.

The corridor in which you are standing has freely moving water in the soil, which carried with it a supply of nutrients and so several species grow well here.

The forest manager must decide whether to manage for individual species or groups of species. In this case, white ash, red oak and yellow birch are all performing well.

How would you treat this stand?

At this stage, a forester would likely prescribe a crop tree release of these high quality pole-size trees. Since most of the species are midway between tolerant and intolerant of shade this stand would ultimately be cut and regenerated using the Shelterwood System.

Post 16 marks the end of the Forest Management Trail. The trail continues downhill and back to the Frost Centre.

On the tour, you have seen examples of the Selection, Shelterwood, and Clearcutting systems, used in a variety of species and site conditions. These three systems allow the forest to reproduce itself. As well, you walked through young stands being improved by crop tree release. Did you notice the cutting systems used by the Ministry of Natural Resources in the Great Lakes-St. Lawrence forest region also help to maintain and improve wildlife habitat? Wise management will ensure healthy, high quality forests we can all enjoy and use for generations to come.

We hope you have enjoyed walking on the self-guided Forest Management Trail. If you don't wish to take the trail guide home, please deposit it in the trail guide and comments box.

Do you have any comments that would help us improve the trail or the guide? We are eager to hear from you, so please take a minute to sign the register before you leave.



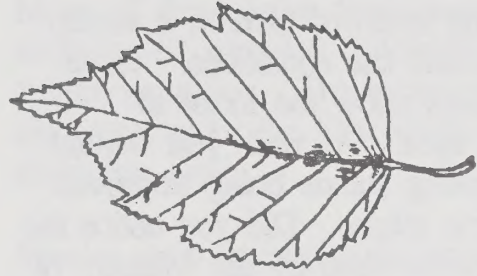
Compound leaf
(white ash)



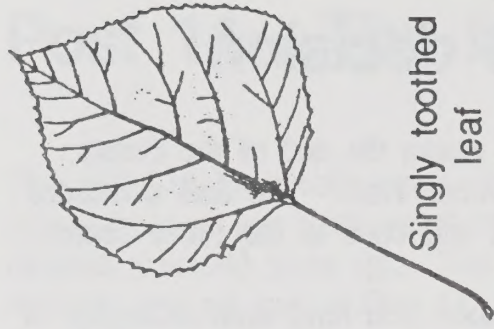
Simple leaf
(ironwood)



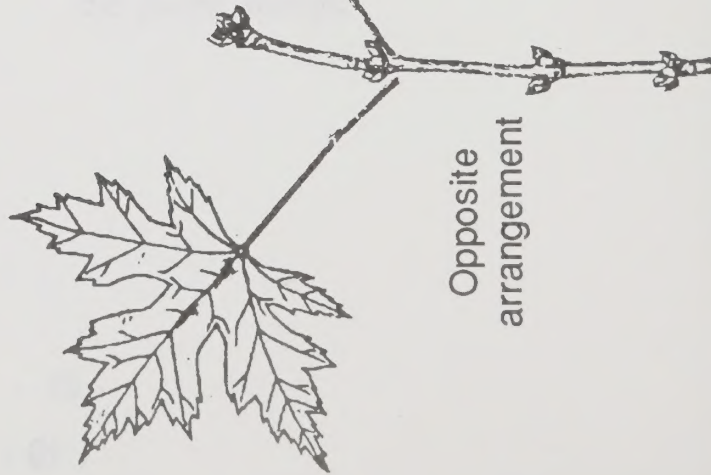
Lobed leaf
(red oak)



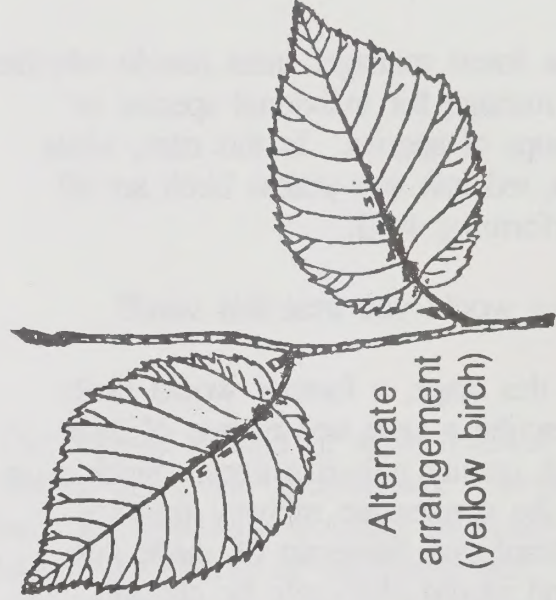
Doubly toothed leaf
(white birch)



Singly toothed
leaf
(trembling aspen)



Opposite
arrangement



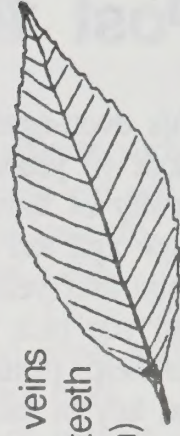
Alternate
arrangement
(yellow birch)



Symmetrical base
(black cherry)



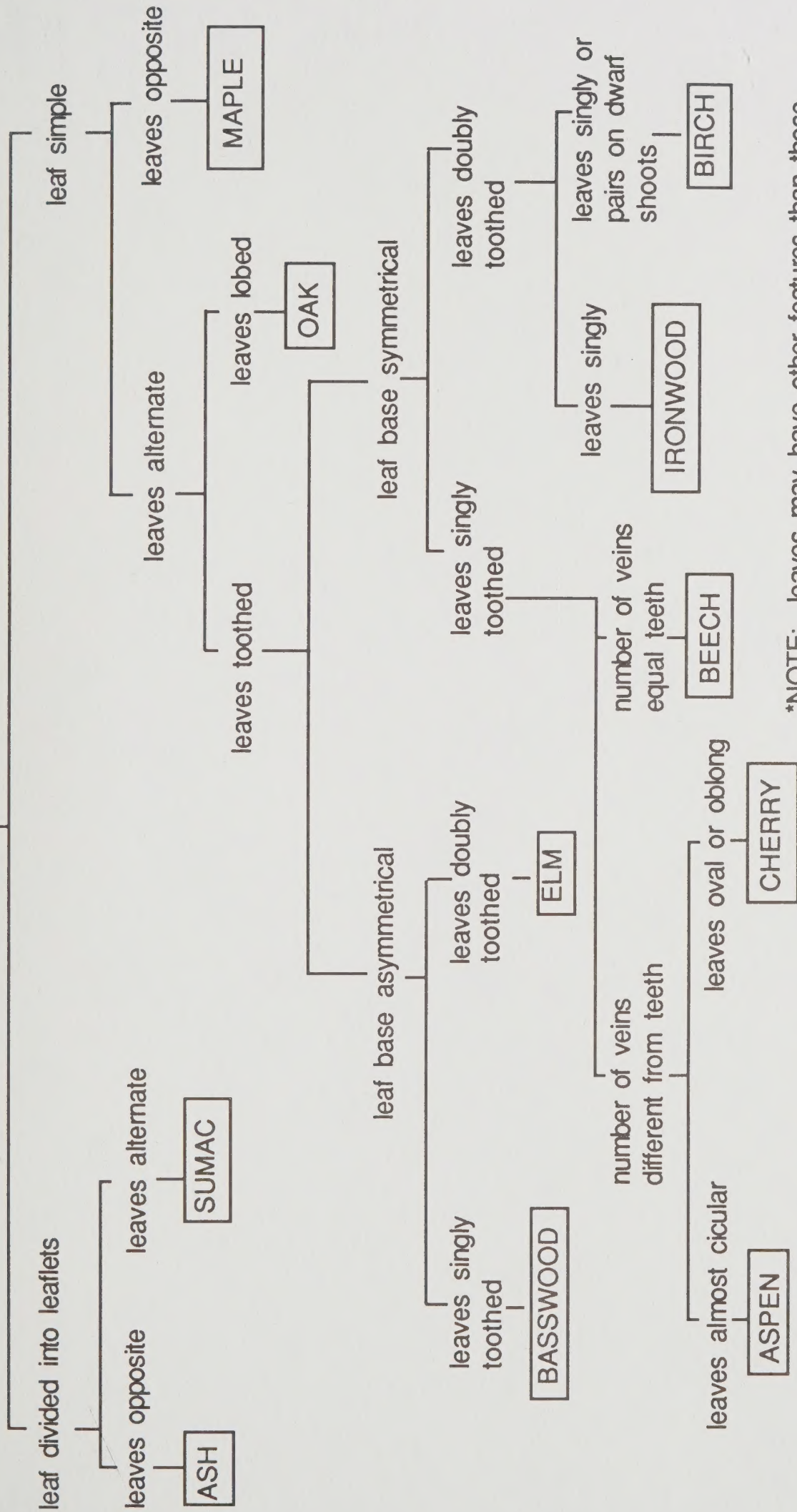
Asymmetrical base
(white elm)



Number of veins
same as teeth
(beech)

SUMMER KEY TO DECIDUOUS TREES

TREE WITH BROAD LEAVES



*NOTE: leaves may have other features than those listed in this key which may be helpful in identification.

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